

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the Application.

Listing of Claims:

1-20. (canceled)

21. (new) A computer-readable medium storing at least one extent of a logical volume having a plurality of extents, the computer-readable medium comprising:

an epoch identifier associated with each at least one extent, the epoch identifier for determining a configuration status based on a comparison of the epoch identifier from each extent of the logical volume.

22. (new) A computer-readable medium as defined in claim 21 wherein the epoch identifier further comprises:

a cluster system identifier.

23. (new) A computer-readable medium as defined in claim 21 wherein the epoch identifier further comprises:

a logical volume identifier.

24. (new) A computer-readable medium as defined in claim 21 wherein the epoch identifier further comprises:

a cluster system identifier and a logical volume identifier.

25. (new) A computer-readable medium as defined in claim 21 wherein the computer-readable medium has stored thereon all of the plurality of extents for the logical volume.

26. (new) A computer-readable medium as defined in claim 21 wherein the epoch identifier comprises:

a number that is incremented upon each change in volume configuration.

27. (new) A computer-readable medium as defined in claim 21 wherein the epoch identifier comprises:

a timestamp indicating a time a volume configuration was changed.

28. (new) A computer-readable medium as defined in claim 21 wherein the data structure further comprises:

an extent size;

an extent identifier.

29. (new) A device comprising:

a computer-readable medium as claimed in claim 21; and

a processor that accesses data stored in the logical volume based on the configuration status of the logical volume determined from the comparison of the epoch identifier from each extent of the logical volume.

30. (new) A data storage subsystem comprising:

a first computer-readable medium storing one or more first extents associated with a first logical volume, wherein each first extent includes a first data structure storing an epoch identifier, the epoch identifier for determining a configuration status of the first logical volume based on a comparison of the epoch identifier from each first extent associated with the first logical volume; and

a second computer-readable medium storing one or more second extents associated with a copy of the first logical volume, wherein each second extent includes a second data structure storing a copy epoch identifier, the copy epoch identifier for determining a configuration status of the copy of the first logical volume based on a comparison of the copy epoch identifier from each second extent associated with the copy of the logical volume.

31. (new) A data storage subsystem as defined in claim 30 further comprising:

a cluster service component including a third data structure storing a volume epoch identifier.

32. (new) A data storage subsystem as defined in claim 30, wherein each of the epoch identifiers and the copy epoch identifiers have the same value.

33. (new) A data storage subsystem as defined in claim 31, wherein the cluster service component may be set by a user to expose the first logical volume as on line if the epoch identifiers of each first extent of the first logical volume are the same as the volume epoch identifier.

34. (new) A data storage subsystem as defined in claim 31, wherein the cluster service component may be set by a user to expose the first logical volume as on line only if the epoch identifiers of each first extent associated with the first logical volume and the copy epoch identifiers of each second extent of the copy of the first logical volume are the same as the volume epoch identifier.

35. (new) A data storage subsystem as defined in claim 30, wherein

each first data structure includes a cluster system identifier; and

each second data structure includes the cluster system identifier.

36. (new) A data storage subsystem as defined in claim 30, wherein

each first data structure includes a first logical volume identifier; and

each second data structure includes a second logical volume identifier.

37. (new) A data storage subsystem as defined in claim 36, wherein the first and second logical volume identifiers are the same.

38. (new) A computer-readable medium having computer-executable instructions for performing a method for exposing a logical volume as on line, the method comprising:

- reading an epoch value from each extent of the logical volume;
- reading a copy epoch value from each extent of a mirrored copy of the logical volume;
- comparing the epoch value from each extent of the logical volume and the copy epoch value from each extent of a mirrored copy of the logical volume;
- receiving a user selection indicating a selected consistency level; and
- determining a configuration status based on the comparison of the epoch value from each extent of the logical volume and the copy epoch value from each extent of a mirrored copy of the logical volume, and the selected consistency level.

39. (new) A computer-readable medium as defined in claim 38, wherein determining comprises:

- determining a configuration status that exposes the logical volume as on line only when the epoch values and the copy epoch values are equal if the selected consistency level is a first consistency level.

40. (new) A computer-readable medium as defined in claim 39, wherein determining comprises:

- determining a configuration status that exposes the logical volume as on line when the epoch value of each extent of the logical volume are equal if the selected consistency level is a second consistency level.

41. (new) A computer-readable medium as defined in claim 40, wherein determining comprises:

- determining the configuration status that exposes the mirrored copy of the logical volume as on line when the copy epoch value of each extent of the mirrored copy of the logical volume are equal if the selected consistency level is the second consistency level.

42. (new) A computer-readable medium as defined in claim 38 further comprising:

- maintaining a volume epoch value;
- comparing the epoch value from each extent of the logical volume, the copy epoch value from each extent of a mirrored copy of the logical volume and the volume epoch value; and
- determining a configuration status based on the comparison of the epoch value from each extent of the logical volume, the copy epoch value from each extent of a mirrored copy of the logical volume and the volume epoch value, and the selected consistency level.

43. (new) A computer-readable medium as defined in claim 42 wherein determining comprises:

determining a configuration status that exposes the logical volume as on line only when the epoch values, the copy epoch values, and the volume epoch value are all equal if the selected consistency level is a first consistency level.

44. (new) A computer-readable medium as defined in claim 42, wherein determining comprises:

determining a configuration status that exposes the logical volume as on line when the epoch value of each extent of the logical volume and the volume epoch value are equal if the selected consistency level is a third consistency level.

45. (new) A computer-readable medium as defined in claim 44, wherein determining comprises:

determining the configuration status that exposes the mirrored copy of the logical volume as on line when the copy epoch value of each extent of the mirrored copy of the logical volume and the volume epoch value are equal if the selected consistency level is the third consistency level.

46. (new) A computer-implemented method for exposing a logical volume as on line, the method comprising:

reading an epoch value from each extent of the logical volume;

reading a copy epoch value from each extent of a mirrored copy of the logical volume; and

determining a configuration status based on a comparison of the epoch value from each extent of the logical volume, the copy epoch value from each extent of a mirrored copy of the logical volume, and a selected consistency level.

47. (new) A computer-implemented method as defined in claim 46, wherein determining comprises:

determining a configuration status that exposes the logical volume as on line only when the epoch values and the copy epoch values are equal if the selected consistency level is a first consistency level.

48. (new) A computer-implemented method as defined in claim 47, wherein determining comprises:

determining a configuration status that exposes the logical volume as on line when the epoch value of each extent of the logical volume are equal if the selected consistency level is a second consistency level.

49. (new) A computer-implemented method as defined in claim 48, wherein determining comprises:

determining the configuration status that exposes the mirrored copy of the logical volume as on line when the copy epoch value of each extent of the mirrored copy of the logical volume are equal if the selected consistency level is the second consistency level.

50. (new) A computer-implemented method as defined in claim 46 further comprising:
maintaining a volume epoch value; and
determining a configuration status based on a comparison of the epoch value from each extent of the logical volume, the copy epoch value from each extent of a mirrored copy of the logical volume, the selected consistency level, and the volume epoch value.

51. (new) A computer-implemented method as defined in claim 50 wherein determining comprises:

determining a configuration status that exposes the logical volume as on line only when the epoch values, the copy epoch values, and the volume epoch value are all equal if the selected consistency level is the first consistency level.

52. (new) A computer-implemented method as defined in claim 50, wherein determining comprises:

determining a configuration status that exposes the logical volume as on line when the epoch value of each extent of the logical volume and the volume epoch value are equal if the selected consistency level is a third consistency level.

53. (new) A computer-implemented method as defined in claim 52, wherein determining comprises:

determining the configuration status that exposes the mirrored copy of the logical volume as on line when the copy epoch value of each extent of the mirrored copy of the logical volume and the volume epoch value are equal if the selected consistency level is the third consistency level.